



EXPERIMENT NO. 7

UNIT WEIGHT OF AGGREGATES





GROUP NO.4

CARINGAL, JANNA GRAZIELLA M.

ONGTO, ARIANNA MICHAELA S.

FELIX, FRANCINE KYLE CHLOE G.

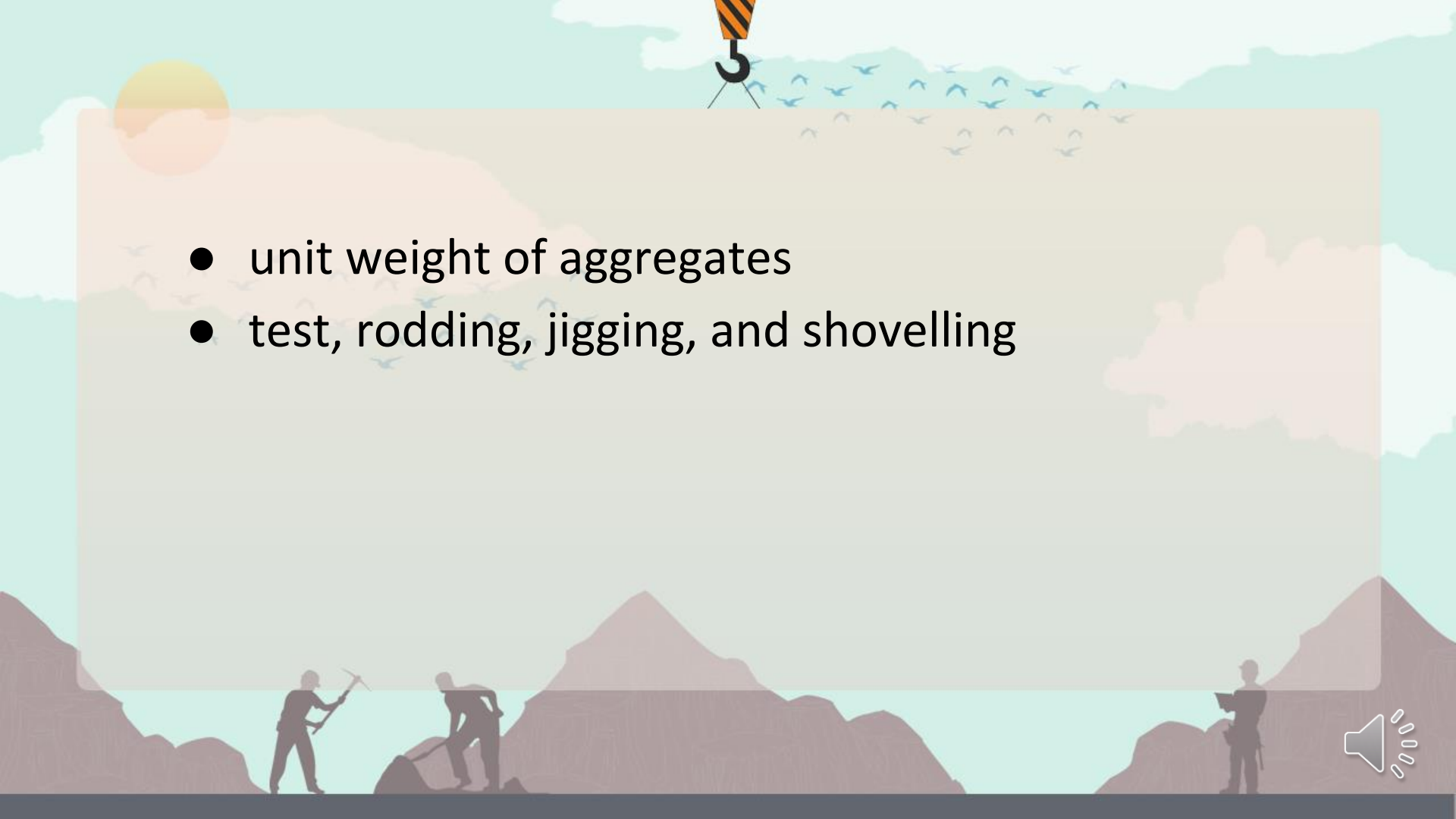
VILLANUEVA, DANIEL KENNETH.





INTRODUCTION



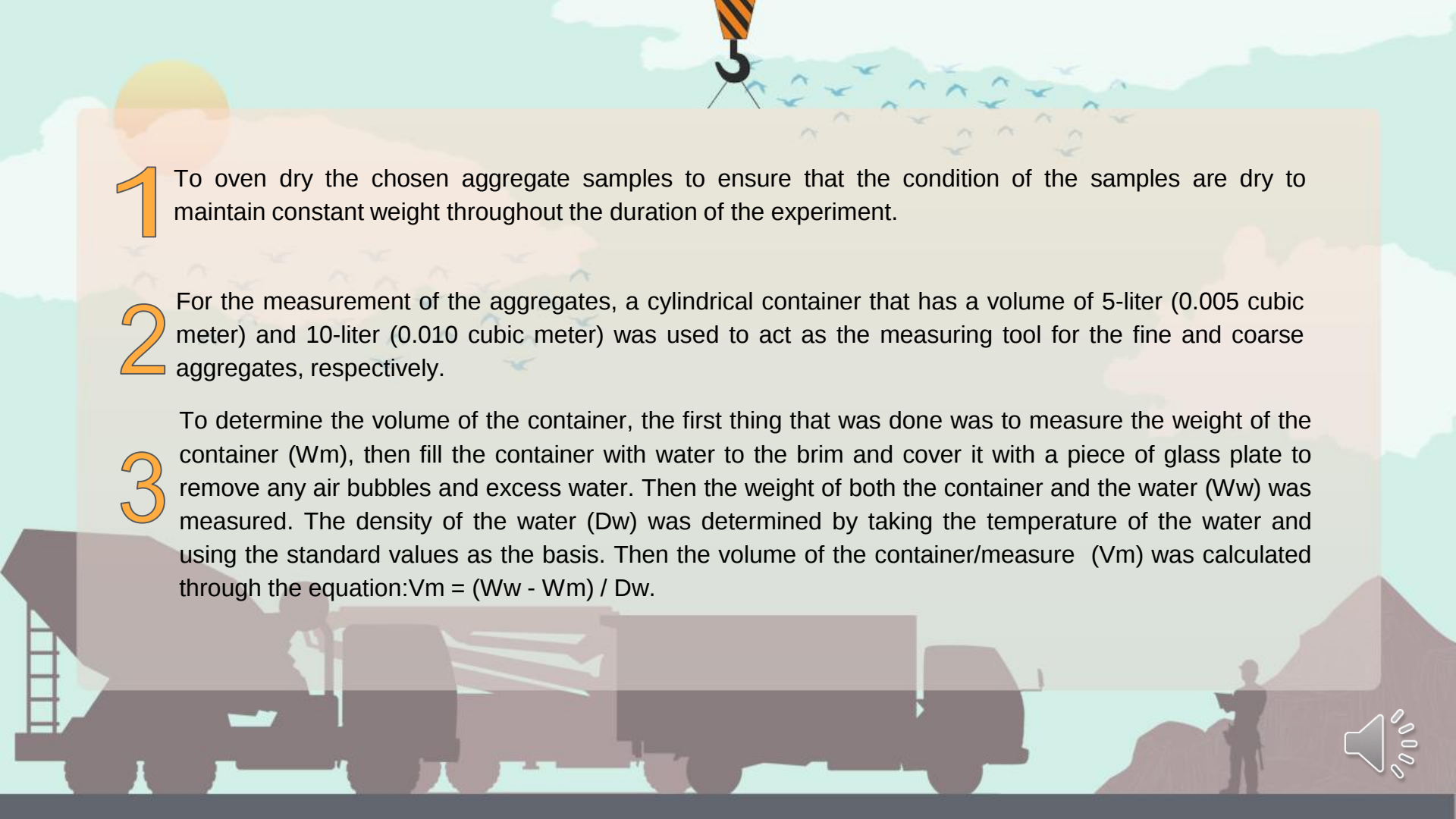
- 
- The background is a stylized illustration of a construction site. At the top center, a crane with a black and yellow striped hook hangs down. A flock of blue birds is flying across the sky. In the bottom left, two workers in black silhouettes are working with tools on a pile of brown material. In the bottom right, another worker in a black silhouette stands near a pile of brown material. The sky is a mix of light blue and white clouds. A large, semi-transparent light orange rectangle is in the center, containing the text.
- unit weight of aggregates
 - test, rodding, jigging, and shovelling





PROCEDURES



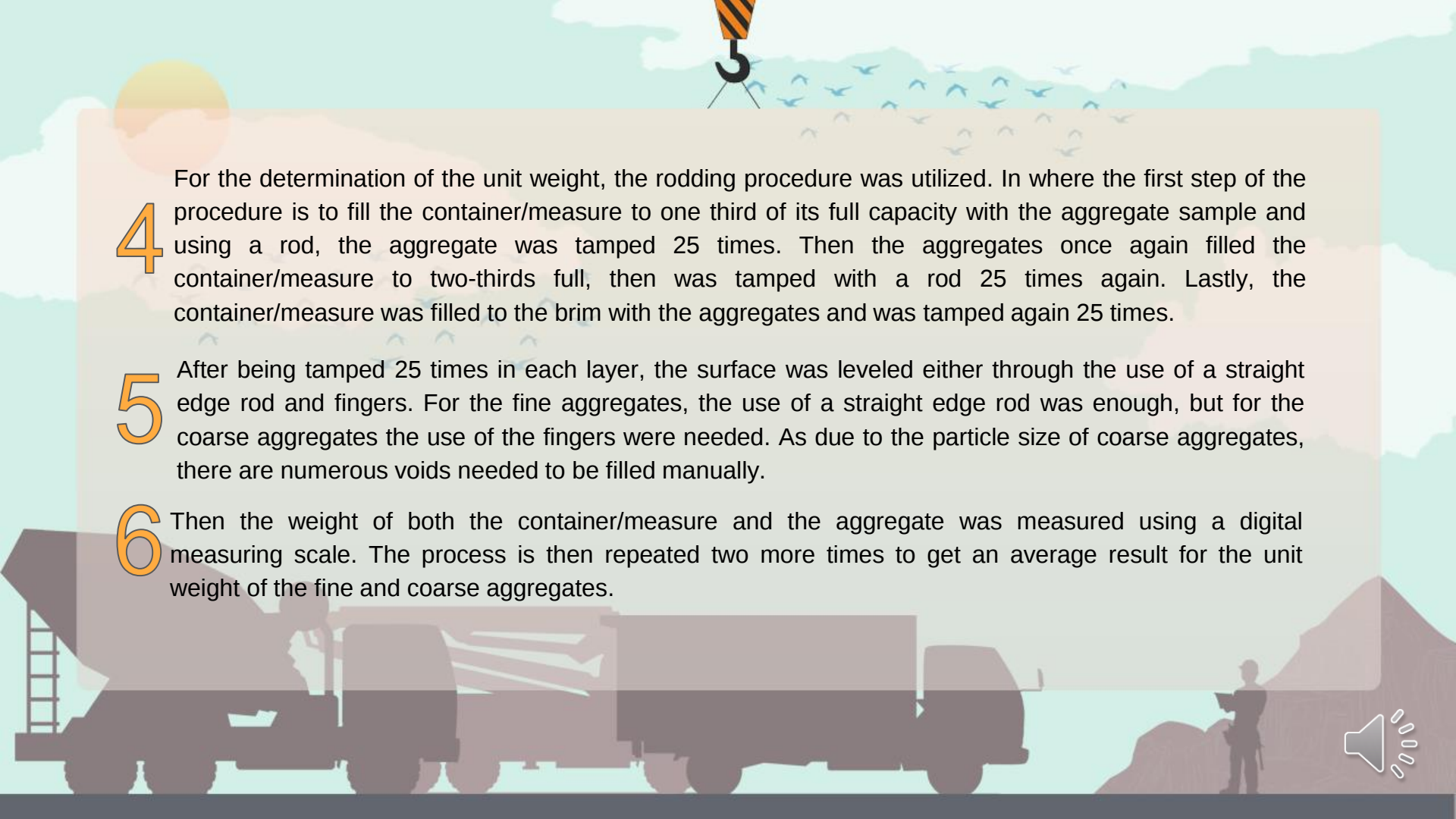


1 To oven dry the chosen aggregate samples to ensure that the condition of the samples are dry to maintain constant weight throughout the duration of the experiment.

2 For the measurement of the aggregates, a cylindrical container that has a volume of 5-liter (0.005 cubic meter) and 10-liter (0.010 cubic meter) was used to act as the measuring tool for the fine and coarse aggregates, respectively.

3 To determine the volume of the container, the first thing that was done was to measure the weight of the container (W_m), then fill the container with water to the brim and cover it with a piece of glass plate to remove any air bubbles and excess water. Then the weight of both the container and the water (W_w) was measured. The density of the water (D_w) was determined by taking the temperature of the water and using the standard values as the basis. Then the volume of the container/measure (V_m) was calculated through the equation: $V_m = (W_w - W_m) / D_w$.





4

For the determination of the unit weight, the rodding procedure was utilized. In where the first step of the procedure is to fill the container/measure to one third of its full capacity with the aggregate sample and using a rod, the aggregate was tamped 25 times. Then the aggregates once again filled the container/measure to two-thirds full, then was tamped with a rod 25 times again. Lastly, the container/measure was filled to the brim with the aggregates and was tamped again 25 times.

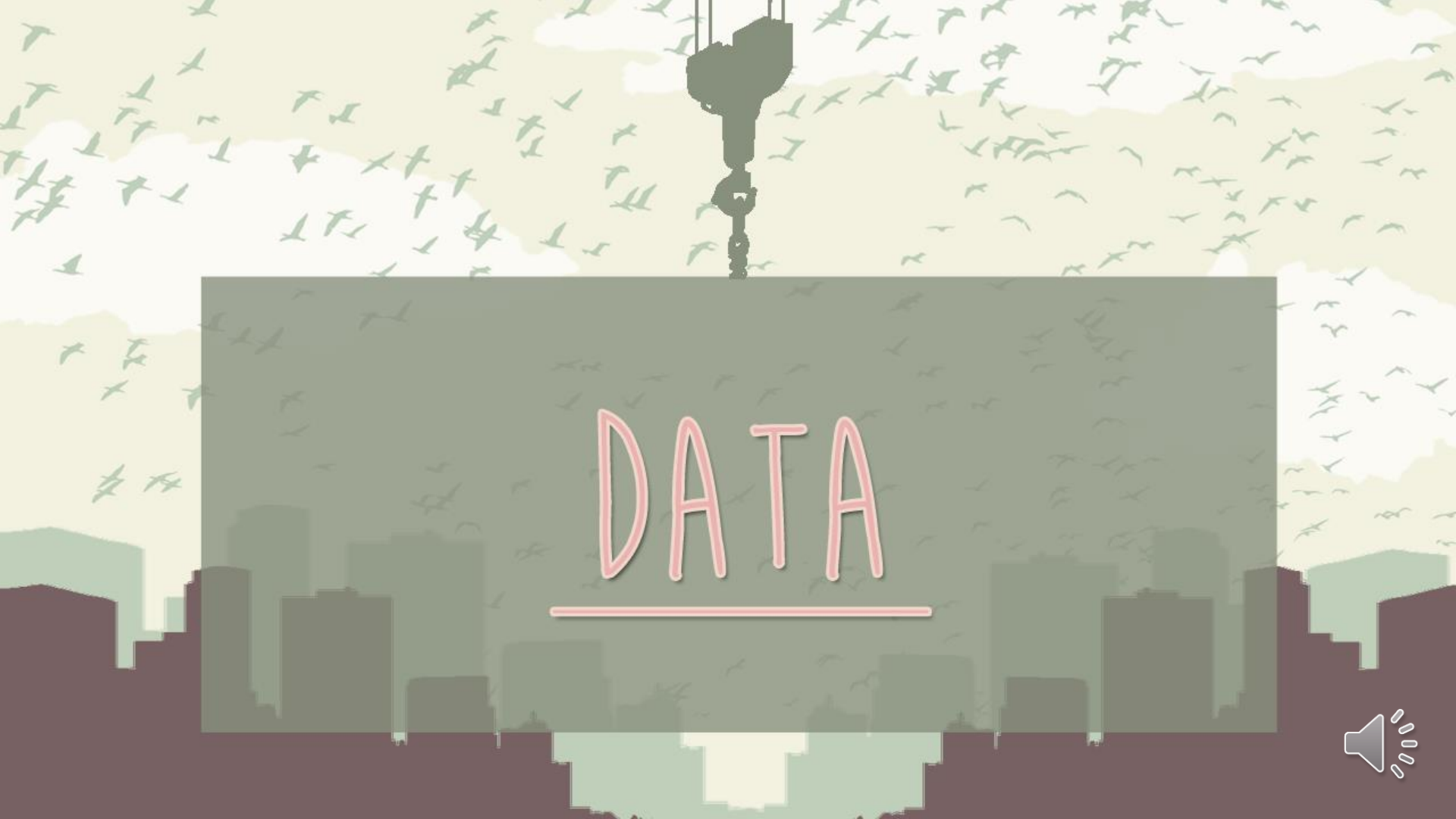
5

After being tamped 25 times in each layer, the surface was leveled either through the use of a straight edge rod and fingers. For the fine aggregates, the use of a straight edge rod was enough, but for the coarse aggregates the use of the fingers were needed. As due to the particle size of coarse aggregates, there are numerous voids needed to be filled manually.

6

Then the weight of both the container/measure and the aggregate was measured using a digital measuring scale. The process is then repeated two more times to get an average result for the unit weight of the fine and coarse aggregates.





DATA

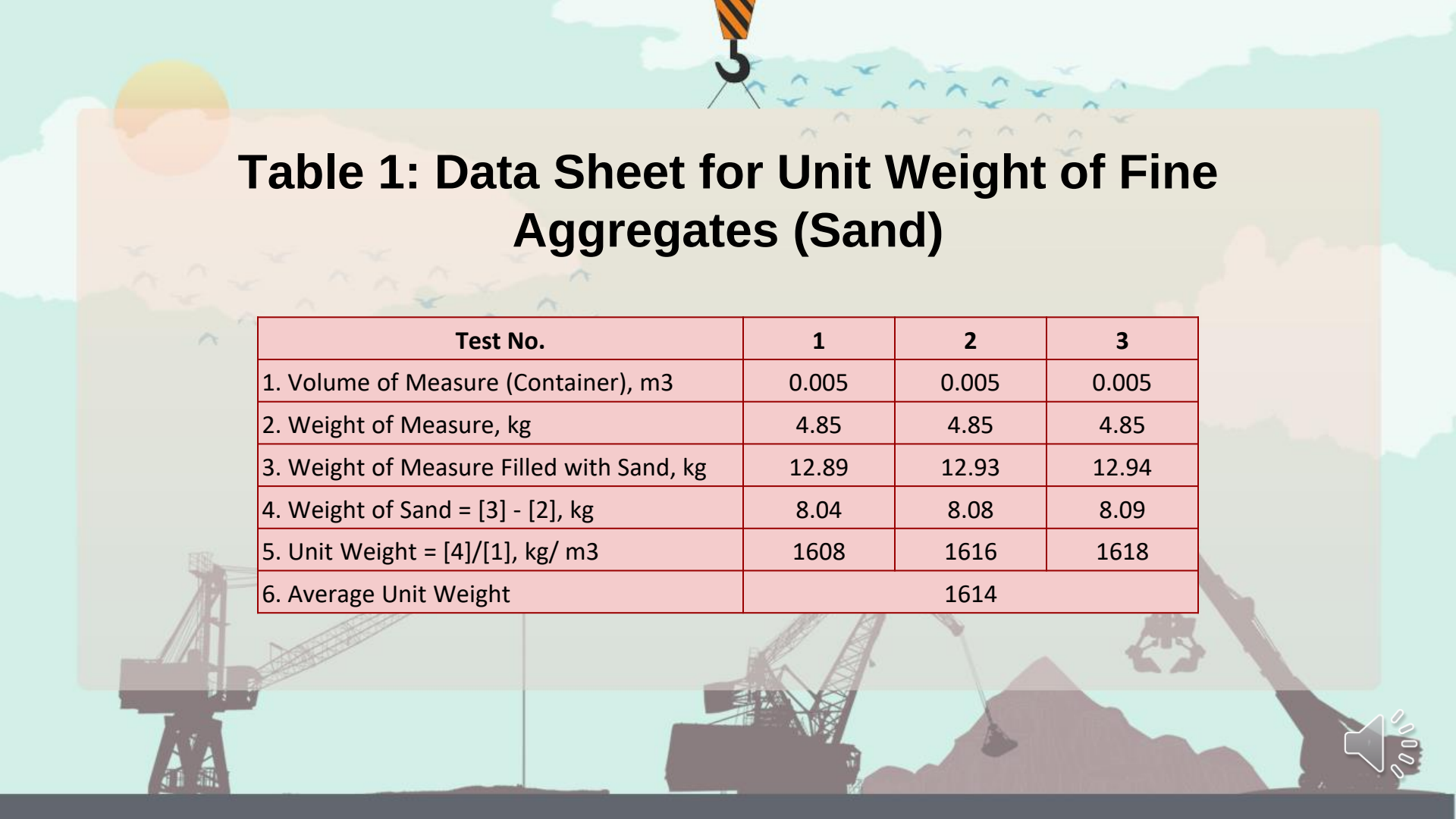


Table 1: Data Sheet for Unit Weight of Fine Aggregates (Sand)

Test No.	1	2	3
1. Volume of Measure (Container), m ³	0.005	0.005	0.005
2. Weight of Measure, kg	4.85	4.85	4.85
3. Weight of Measure Filled with Sand, kg	12.89	12.93	12.94
4. Weight of Sand = [3] - [2], kg	8.04	8.08	8.09
5. Unit Weight = [4]/[1], kg/ m ³	1608	1616	1618
6. Average Unit Weight	1614		



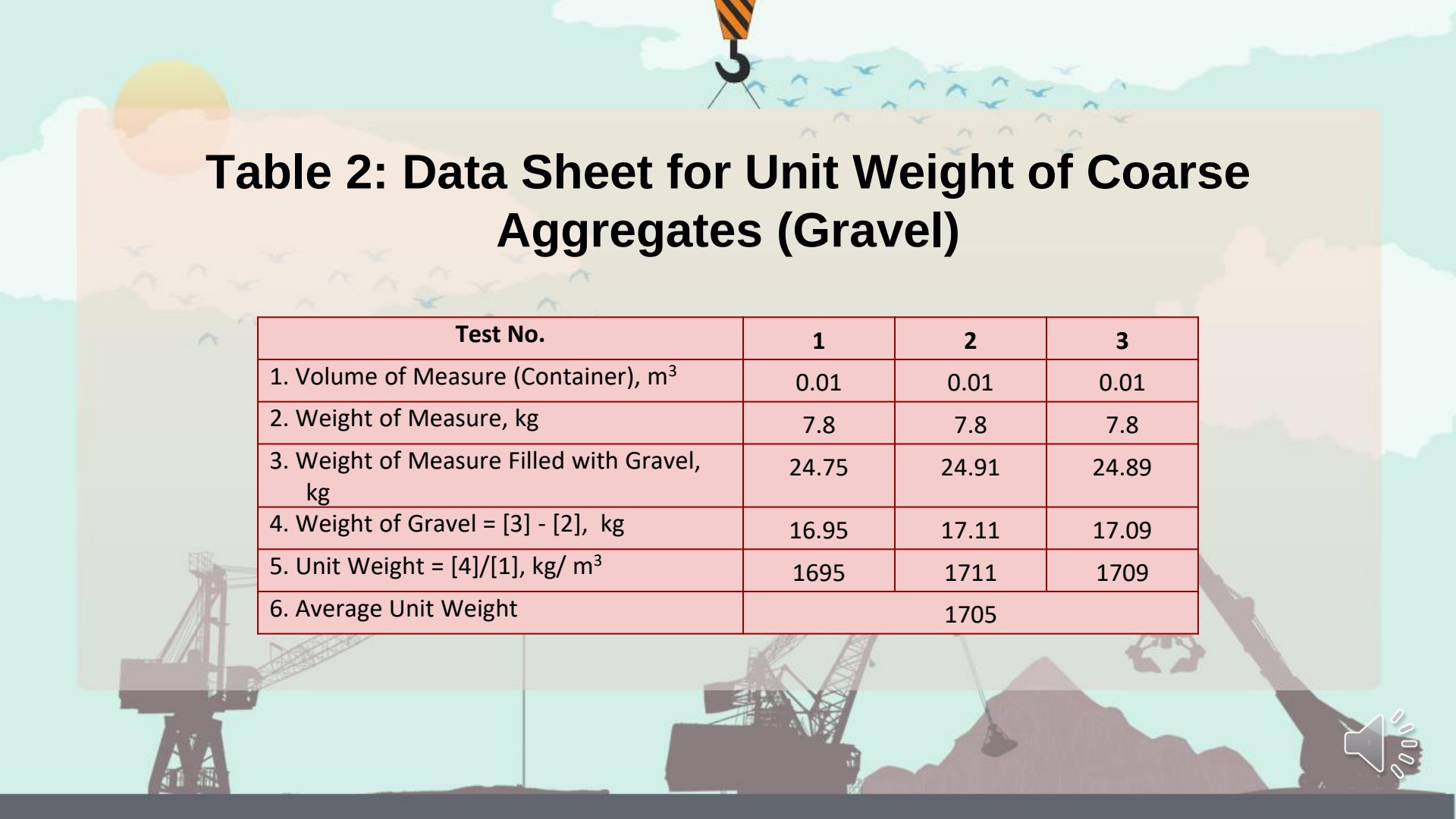
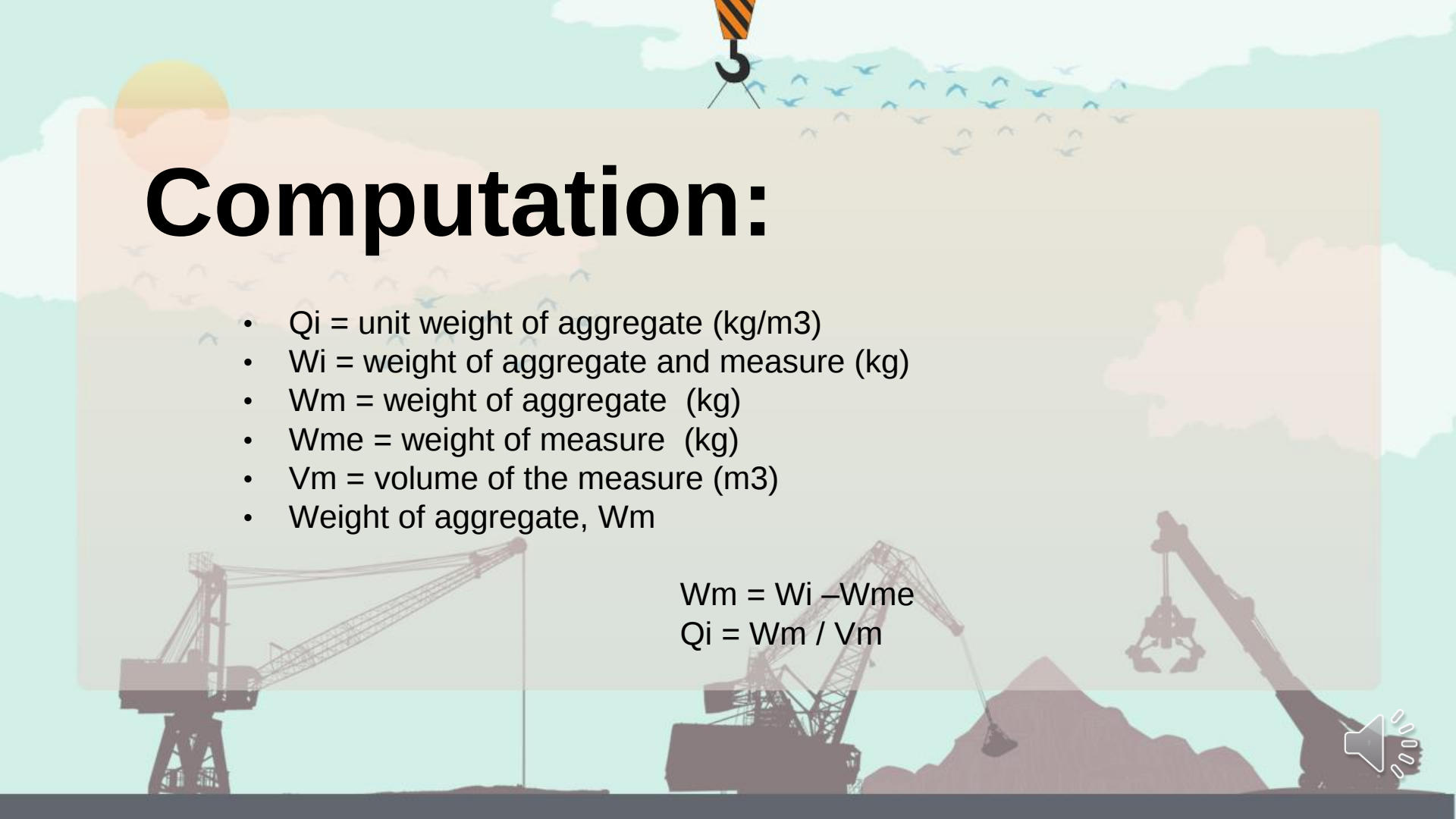


Table 2: Data Sheet for Unit Weight of Coarse Aggregates (Gravel)

Test No.	1	2	3
1. Volume of Measure (Container), m ³	0.01	0.01	0.01
2. Weight of Measure, kg	7.8	7.8	7.8
3. Weight of Measure Filled with Gravel, kg	24.75	24.91	24.89
4. Weight of Gravel = [3] - [2], kg	16.95	17.11	17.09
5. Unit Weight = [4]/[1], kg/ m ³	1695	1711	1709
6. Average Unit Weight	1705		





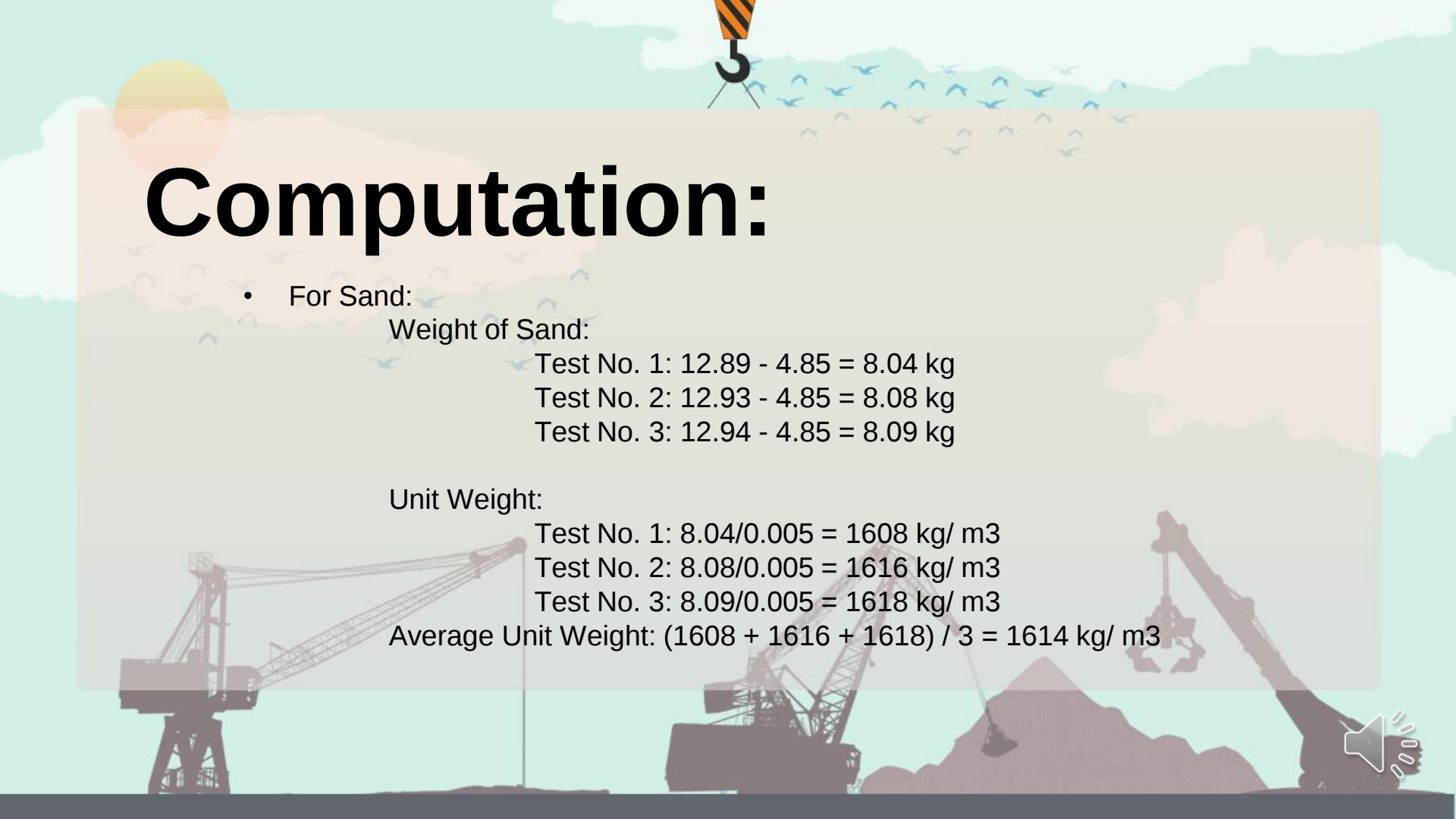
Computation:

- Q_i = unit weight of aggregate (kg/m³)
- W_i = weight of aggregate and measure (kg)
- W_m = weight of aggregate (kg)
- W_{me} = weight of measure (kg)
- V_m = volume of the measure (m³)
- Weight of aggregate, W_m

$$W_m = W_i - W_{me}$$

$$Q_i = W_m / V_m$$





Computation:

- For Sand:

Weight of Sand:

$$\text{Test No. 1: } 12.89 - 4.85 = 8.04 \text{ kg}$$

$$\text{Test No. 2: } 12.93 - 4.85 = 8.08 \text{ kg}$$

$$\text{Test No. 3: } 12.94 - 4.85 = 8.09 \text{ kg}$$

Unit Weight:

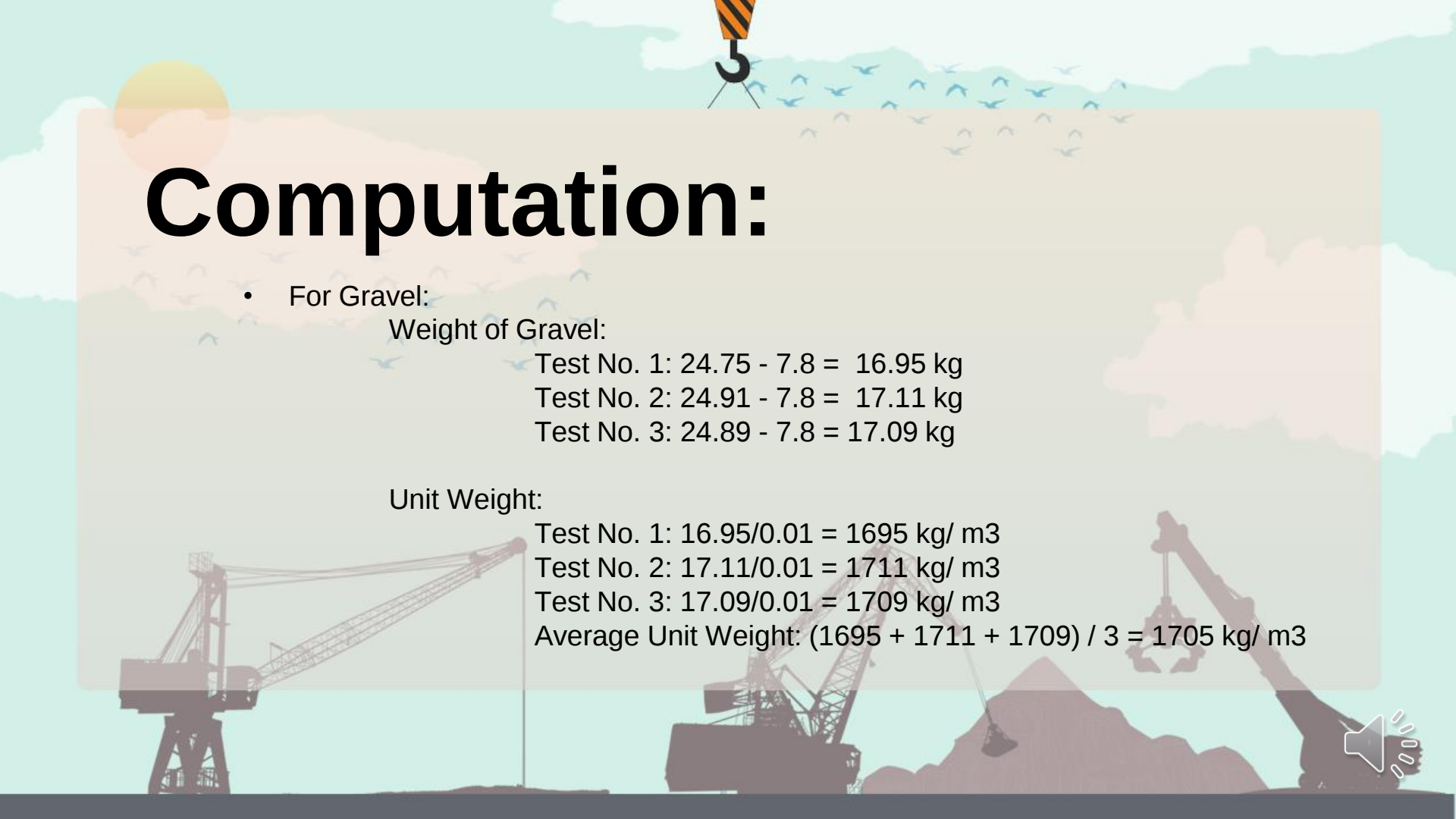
$$\text{Test No. 1: } 8.04 / 0.005 = 1608 \text{ kg/ m}^3$$

$$\text{Test No. 2: } 8.08 / 0.005 = 1616 \text{ kg/ m}^3$$

$$\text{Test No. 3: } 8.09 / 0.005 = 1618 \text{ kg/ m}^3$$

$$\text{Average Unit Weight: } (1608 + 1616 + 1618) / 3 = 1614 \text{ kg/ m}^3$$





Computation:

- For Gravel:

Weight of Gravel:

$$\text{Test No. 1: } 24.75 - 7.8 = 16.95 \text{ kg}$$

$$\text{Test No. 2: } 24.91 - 7.8 = 17.11 \text{ kg}$$

$$\text{Test No. 3: } 24.89 - 7.8 = 17.09 \text{ kg}$$

Unit Weight:

$$\text{Test No. 1: } 16.95 / 0.01 = 1695 \text{ kg/ m}^3$$

$$\text{Test No. 2: } 17.11 / 0.01 = 1711 \text{ kg/ m}^3$$

$$\text{Test No. 3: } 17.09 / 0.01 = 1709 \text{ kg/ m}^3$$

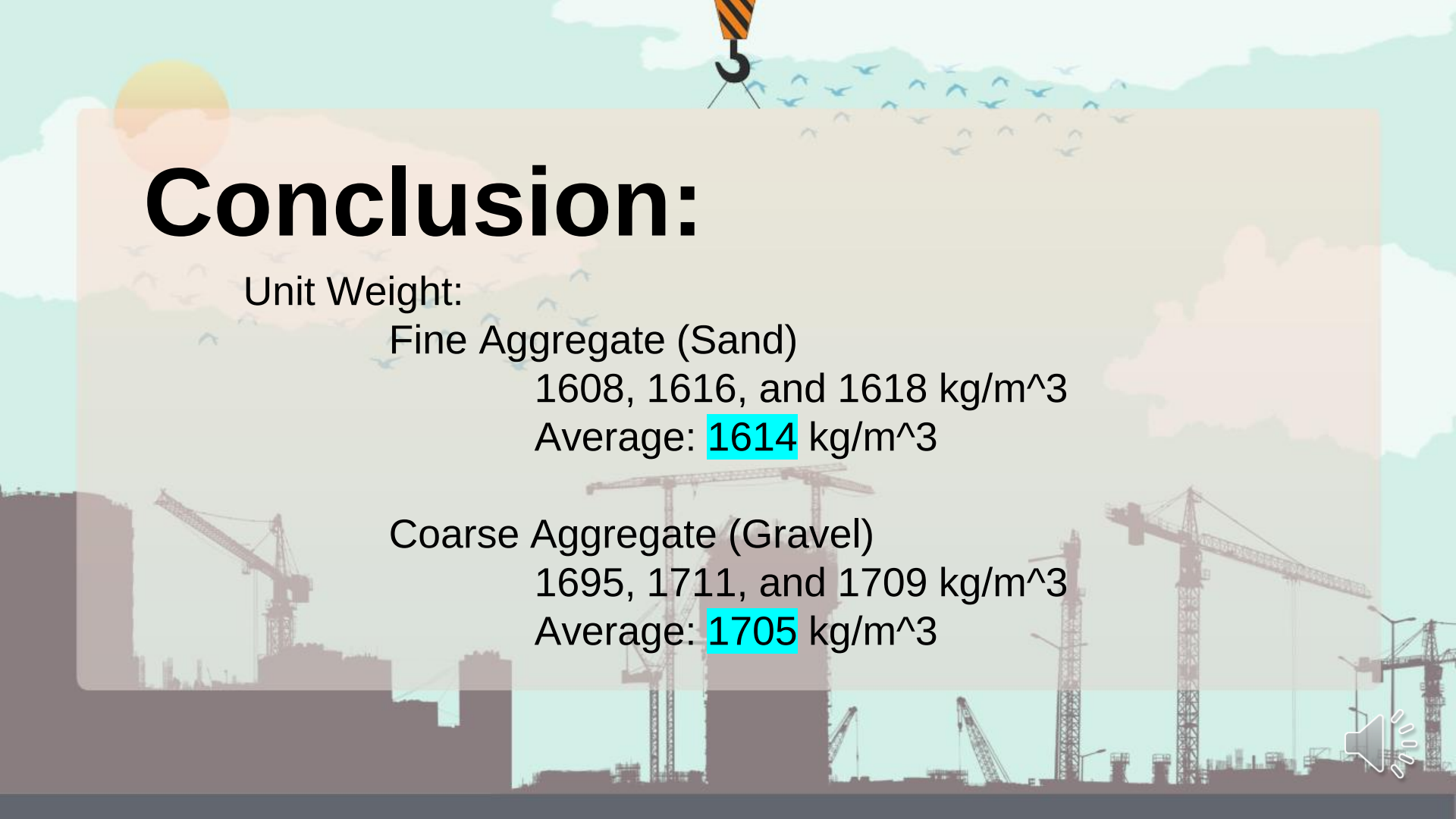
$$\text{Average Unit Weight: } (1695 + 1711 + 1709) / 3 = 1705 \text{ kg/ m}^3$$





CONCLUSION





Conclusion:

Unit Weight:

Fine Aggregate (Sand)

1608, 1616, and 1618 kg/m³

Average: 1614 kg/m³

Coarse Aggregate (Gravel)

1695, 1711, and 1709 kg/m³

Average: 1705 kg/m³





Conclusion:

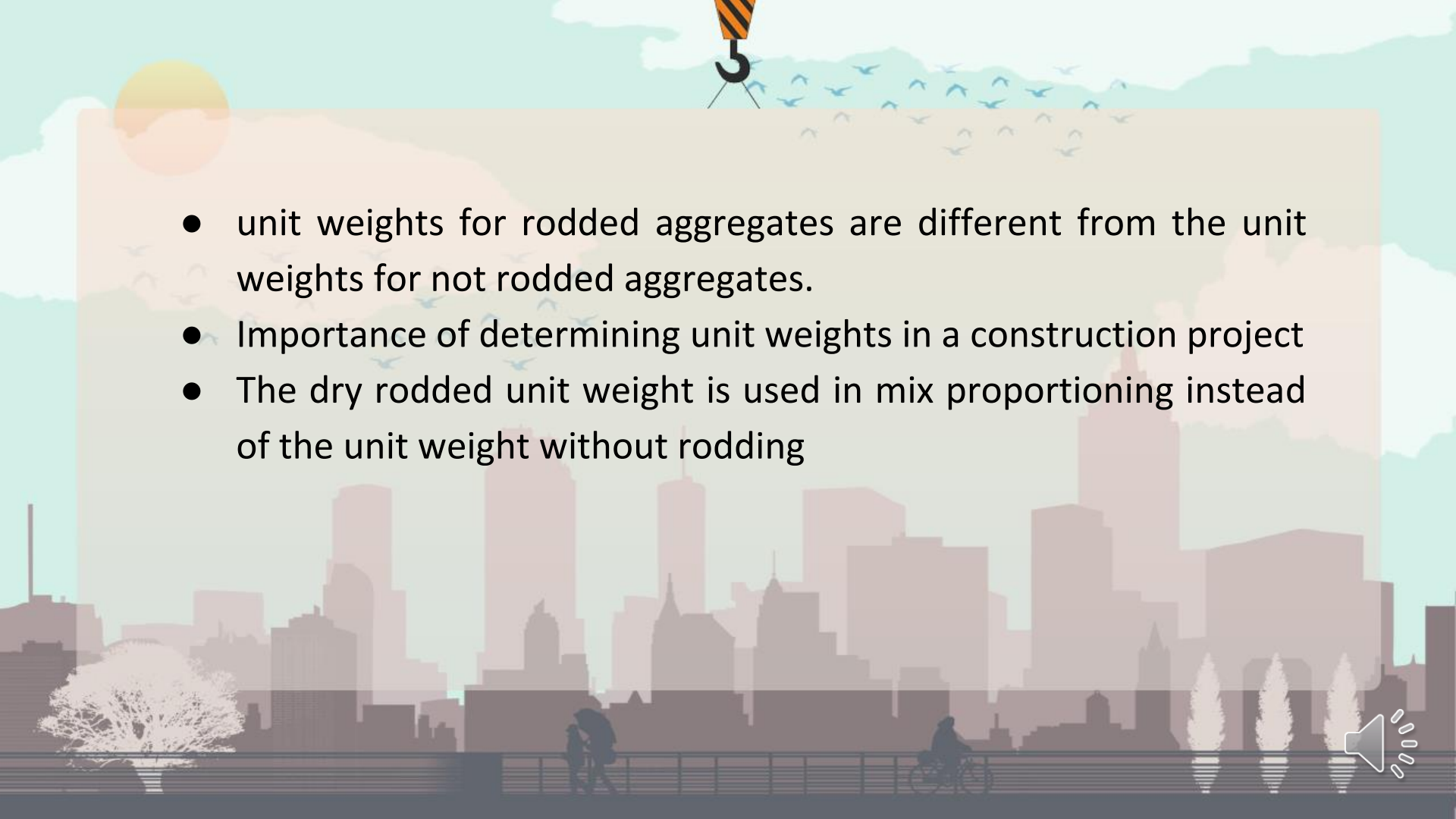
- Unit Weight:
Coarse Aggregate > Fine Aggregate
- Reason:
 - Heavier
 - Greater Volume
 - Larger Surface Area
- Significance:
 - Coarse aggregate favorable:
Concrete Making
 - Ideal to mix both to be well
graded; however: changes in unit weight,
workability, demand.





THINGS LEARNED FROM THE EXPERIMENT

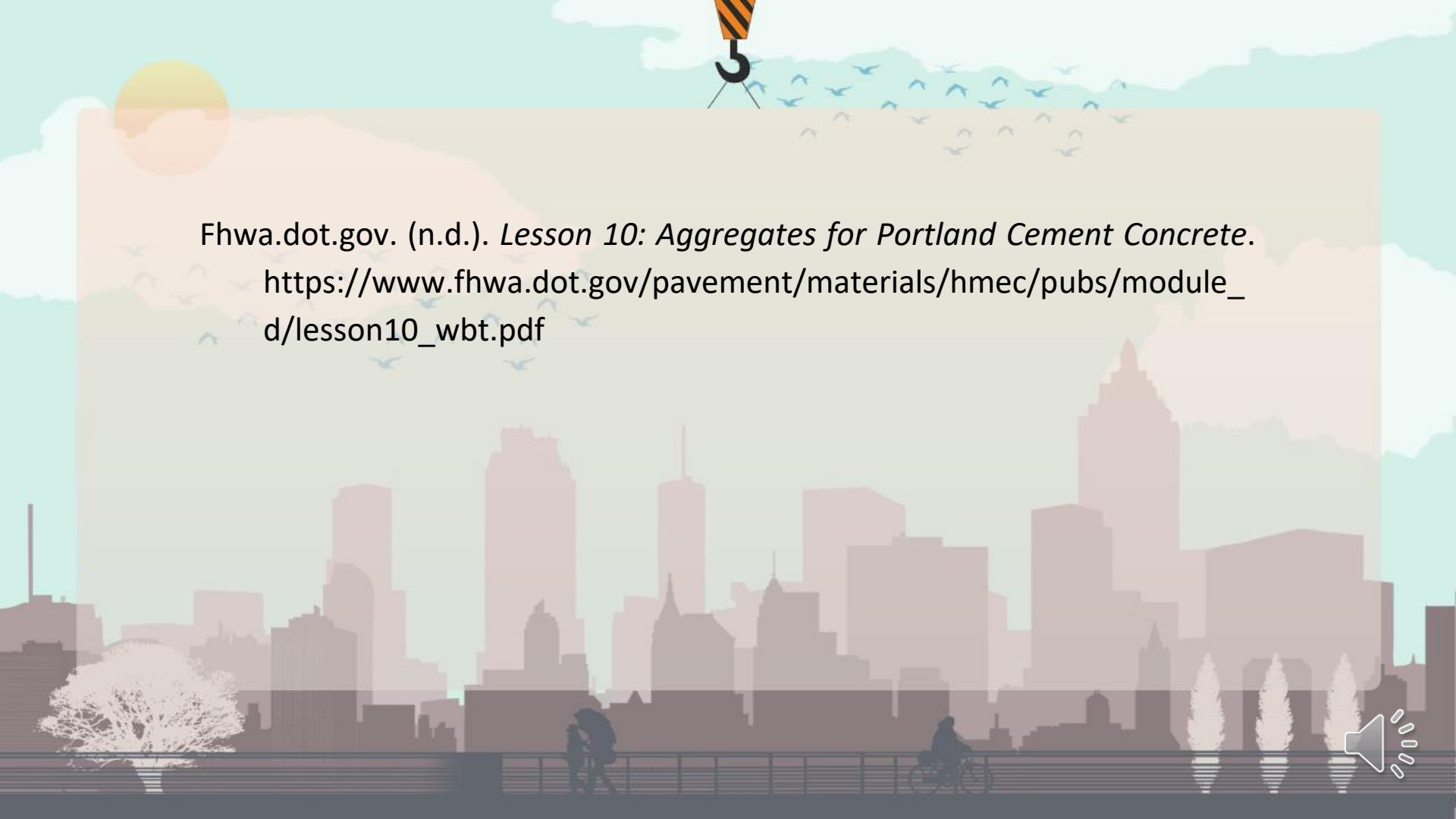


- 
- unit weights for rodded aggregates are different from the unit weights for not rodded aggregates.
 - Importance of determining unit weights in a construction project
 - The dry rodded unit weight is used in mix proportioning instead of the unit weight without rodding



REFERENCES





Fhwa.dot.gov. (n.d.). *Lesson 10: Aggregates for Portland Cement Concrete.*
[https://www.fhwa.dot.gov/pavement/materials/hmec/pubs/module_
d/lesson10_wbt.pdf](https://www.fhwa.dot.gov/pavement/materials/hmec/pubs/module_d/lesson10_wbt.pdf)

